Utah Lake Water Quality Study: Steering Committee Meeting #1

January 4, 2018

Division of Water Quality
Utah Department of Environmental Quality

Overview of Why We're Here Part II

Utah Lake Water Quality Study

Utah Lake Water Quality Timeline

2002 303(d) Impairments (TP)

- 2004-2008 TMDL Initiative
  - Loading Estimates for WWTP, tribs, and misc. sources

2008 Utah Statewide Nutrient Strategy

- TBPEL - 2015
- Headwater criteria – in progress
- Site specific investigation for high priority waters

Utah Lake Harmful Algal Blooms (HABs)

- 2014 - HAB near Lindon Marina
- 2015/2016 - HAB Guidance Document

Utah Lake Water Quality Timeline

2016 303(d) Impairments

- Harmful Algal Blooms
- pH – Provo Bay
- Ammonia – Provo Bay

Utah Lake Water Quality Study

- Initiated in November 2015
  - Phase 1 work plan elements
- November 2016 – Initiated Stakeholder Process development
- June 2017 – Process adopted
- January 2018 – Steering Committee Kickoff
- March 2018 – Phase 1 report complete

Utah Lake Impairment Listings

Year Listed	Water Body	Parameter	Use Impaired
2002	Utah Lake	Total Dissolved Solids	4 – Agricultural
2002	Utah Lake	Total Phosphorus	3B - Aquatic Life
2010	Utah Lake	PCBs	3B - Aquatic Life
2016	Utah Lake	Harmful algal bloom	2B - Recreational
2016	Provo Bay	Ammonia	3B – Aquatic Life
2016	Provo Bay	pH	3B – Aquatic Life

Utah Lake Uses

2B: Protected for infrequent primary contact recreation.
3B: Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.
3D: Protected for waterfowl, shore birds and other water-oriented wildlife, including the necessary aquatic organisms in their food chain.
4: Protected for agricultural uses including irrigation of crops and stock watering.

Overview of Why We're Here Part II

Phase I – What we were trying to accomplish and where we are now

Utah Lake Water Quality Study

Purpose

- Evaluate the role of excess nutrients on designated use impairments
- Identify appropriate in-lake nutrient endpoints

Driving Factors

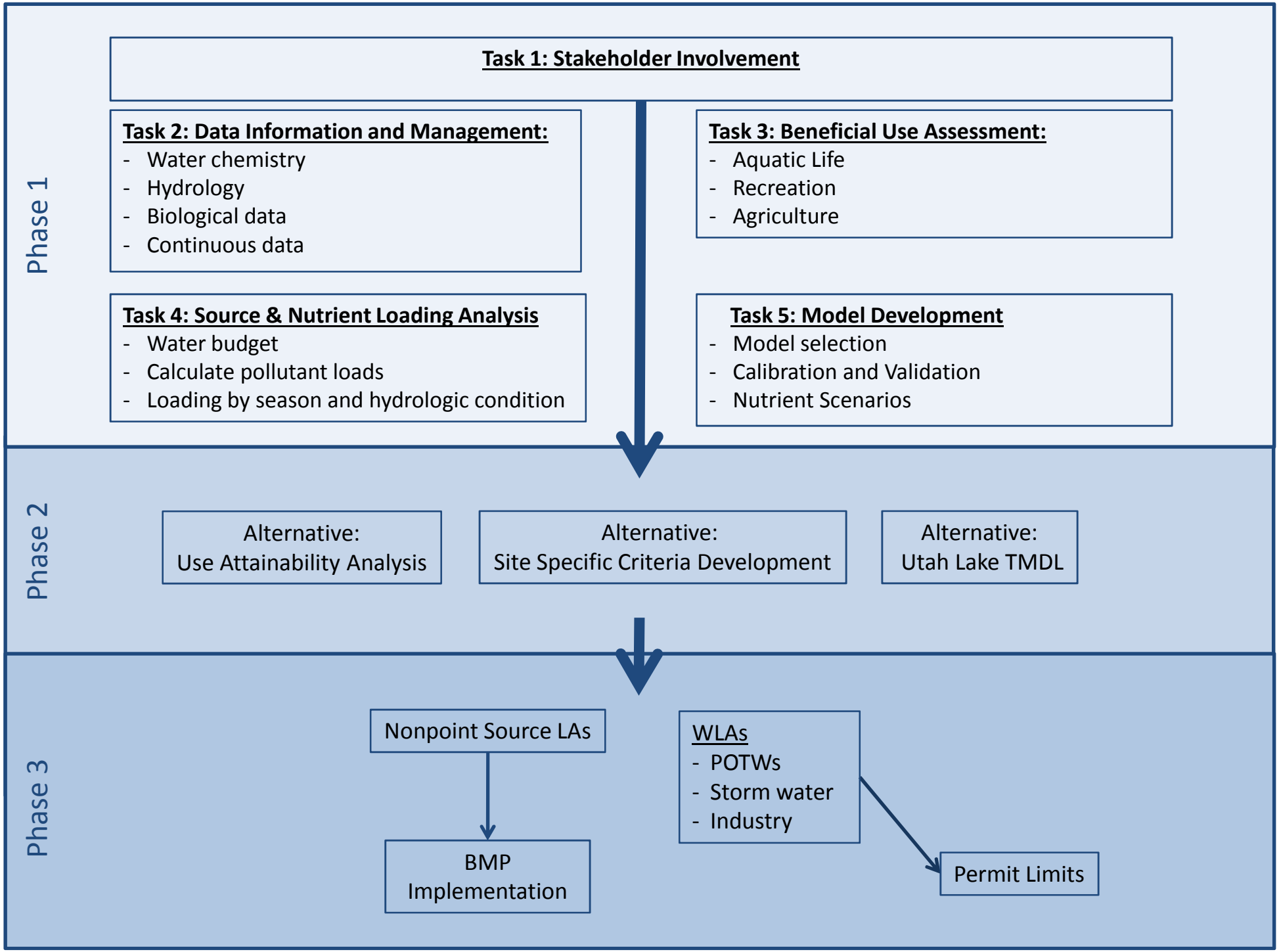
- Nutrient related 303(d) impairments
- Continuation of previous studies
- Recent HAB events
- Regulatory certainty

Funding

- $1 million from Water Quality Board

Implementation

- Discharge permits after January 1, 2030
- Utah Nonpoint Source Program


Phase 1
Task 1: Stakeholder Involvement
Task 2: Data Information and Management:
- Water chemistry
- Hydrology
- Biological data
- Continuous data
Task 3: Beneficial Use Assessment:
- Aquatic Life
- Recreation
- Agriculture
Task 4: Source & Nutrient Loading Analysis
- Water budget
- Calculate pollutant loads
- Loading by season and hydrologic condition
Task 5: Model Development
- Model selection
- Calibration and Validation
- Nutrient Scenarios
Phase 2
Alternative:
Use Attainability Analysis
Alternative:
Site Specific Criteria Development
Alternative:
Utah Lake TMDL
Phase 3
Nonpoint Source LAs
BMP
Implementation
WLAs
- POTWs
- Storm water
- Industry
Permit Limits

Utah Lake Stakeholder Involvement

Utah Lake Water Quality Stakeholder Group

- Tiered from Utah Lake Commission TAC
- 100+ representatives:
  - Local municipalities and Utilities
  - POTWs
  - Local Universities
  - Private Consulting
  - Advocacy Groups
  - State, local and federal government

Water Quality Subgroups

- Data and Information Management (Task 2)
- Beneficial Use Assessment (Task 3)
- Load Analysis (Task 4)
- Model Selection and Development (Task 5)

Project Status: Data and information management (Task 2)

Coordination of monitoring activities

- DWQ Monitoring Activities
    - Sampling Analysis Plan (SAP) & Standard Operating Procedures (SOPs)
- Coordination
    - USU
    - UU
    - Wasatch Front Water Quality Council

Data compilation and database development

- Share data
- Populate Database
- Circulate Database

Literature Review and synthesis

Beneficial Use Assessment (Task 3)

Beneficial use assessment

- Update Integrated Report with recent data as appropriate

Baseline data characterization

- Data completeness
- Analysis of trophic related parameters
- Data gap analysis

Source and Nutrient Load Analysis (Task 4)

Water budget

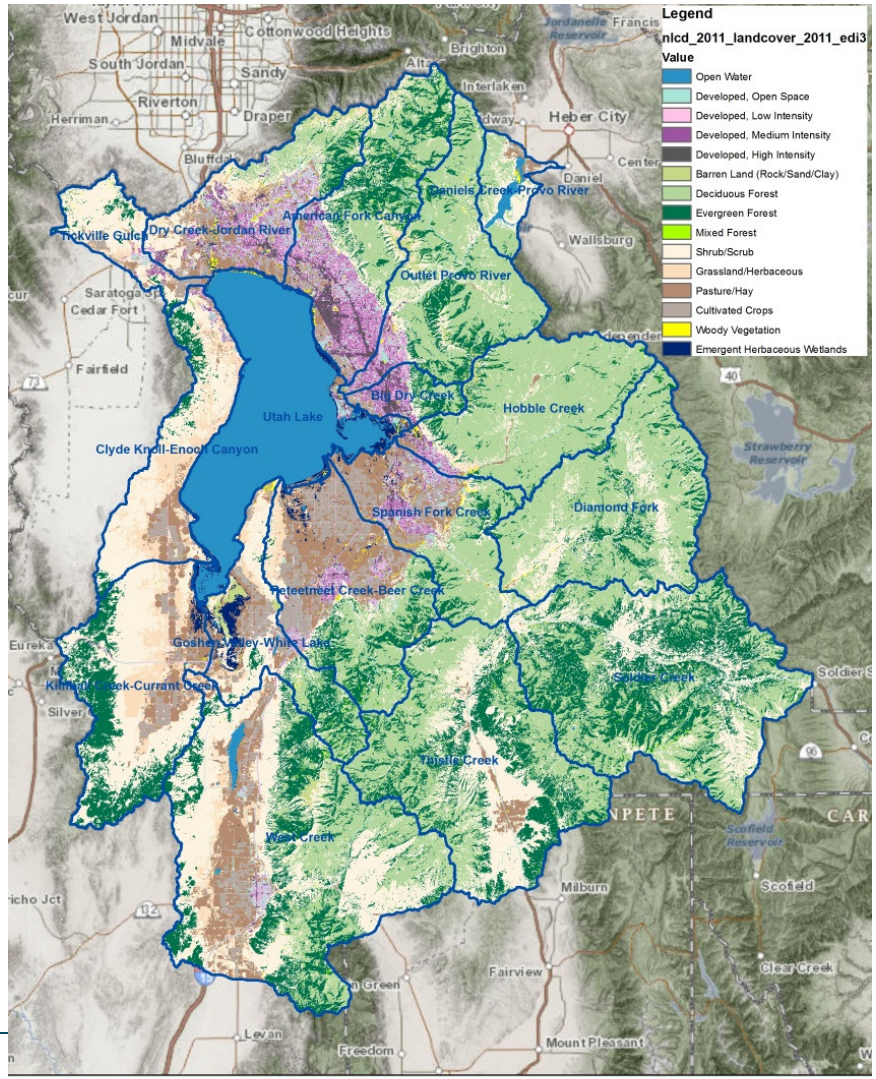
Bulk load analysis

Refine load estimates

- Spring and storm runoff
- Dry weather and base flow
- Seasonal distribution
- Nonpoint source loading

Metadata Characterization

- Watershed loading data evaluation
- Source identification/characterization
- Water budget evaluation
- Monitoring strategy



Model Selection and Development (Task 5)

Model Selection Process

- Stakeholder subgroup
- Evaluate model options
  - Complexity, processes, data requirements, transparency, flexibility, compatibility

Model Selection

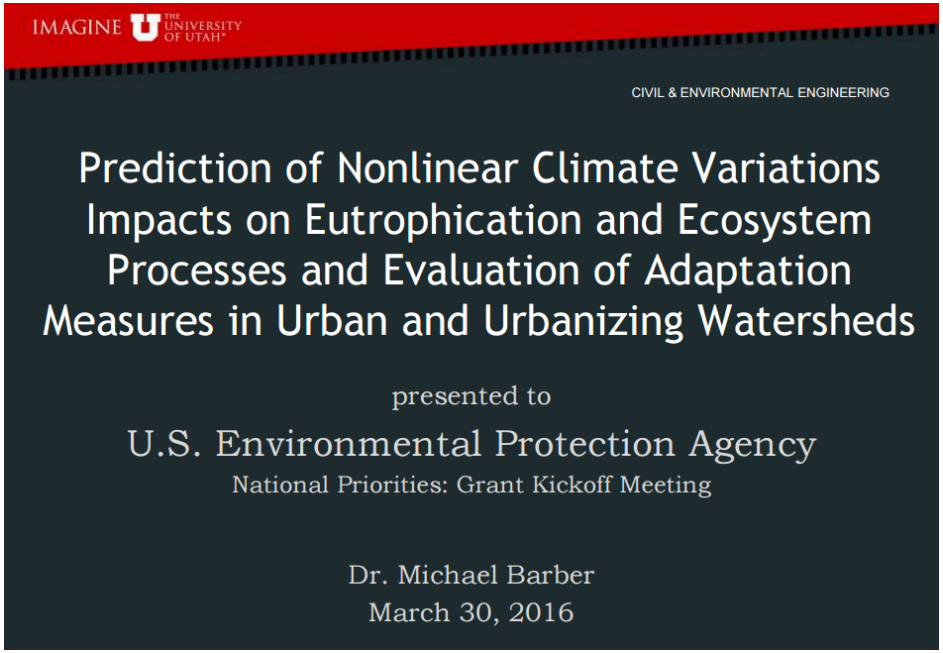
- Water Quality Analysis Simulation Program (WASP)
- Environmental Fluid Dynamic Code (EFDC)

Model Name	WASP	CAEDYM	PCLAKE	CE-QUAL-W2
Spatial Dimension	1D-H	1D-V	0D	2D-V
Stratification	-	+	-	+
Inorganic Sediment Groups	3	2	1	>3
Littoral Zone	-	+	+	-
Phytoplankton Groups	3	7	3	>3
Zooplankton Groups	1	5	1	>3
Benthic Algae Groups	1	4	1	>3
Macrophyte Groups	+	1	1	>3
Macroinvertebrate Groups	0	3	1	0
Fish Groups	0	3	3	0
Bird Groups	0	0	0	0
Hydrodynamics	+	+	±	+
Temperature Dynamics	+	+	+	+
Oxygen Dynamics	+	+	+	+
Inorganic Carbon (CO2/DIC) Dynamics	+	+	-	+
Organic Carbon (DOC/POC) Dynamics	+	+	+	+
Microbial Dynamics	+	+	±	+
Internal Phosphorus Dynamics	+	+	+	+
Phosphorus Sorption to Sediment	±	+	±	±
Internal Nitrogen Dynamics	+	+	+	+
Internal Silica Dynamics	+	+	±	+
Sedimentation/Resuspension	±	+	±	±
Sediment Diagenesis	+	+	±	+
Fisheries Management	-	±	+	-
Dredging	-	-	+	-
Mowing	-	-	+	-
Ice Cover	+	-	-	+
Clear-Turbid State Transition	-	±	+	±

Model Selection and Development (Task 5)

Goal

"…to develop and improved system-wide quality and quantity model of the Jordan River watershed than can be used by stakeholders to improve planning related to water supply and demand forecasting, TMDL planning and implementation, policy decisions related to urban grown and water project, and public education and outreach."



Research Team

- Michael Barber, Ph.D
- Steve Burian, Ph.D
- Ramesh Goel, Ph.D
- Sarah Hinners, Ph.D
- Brett Clark, Ph.D

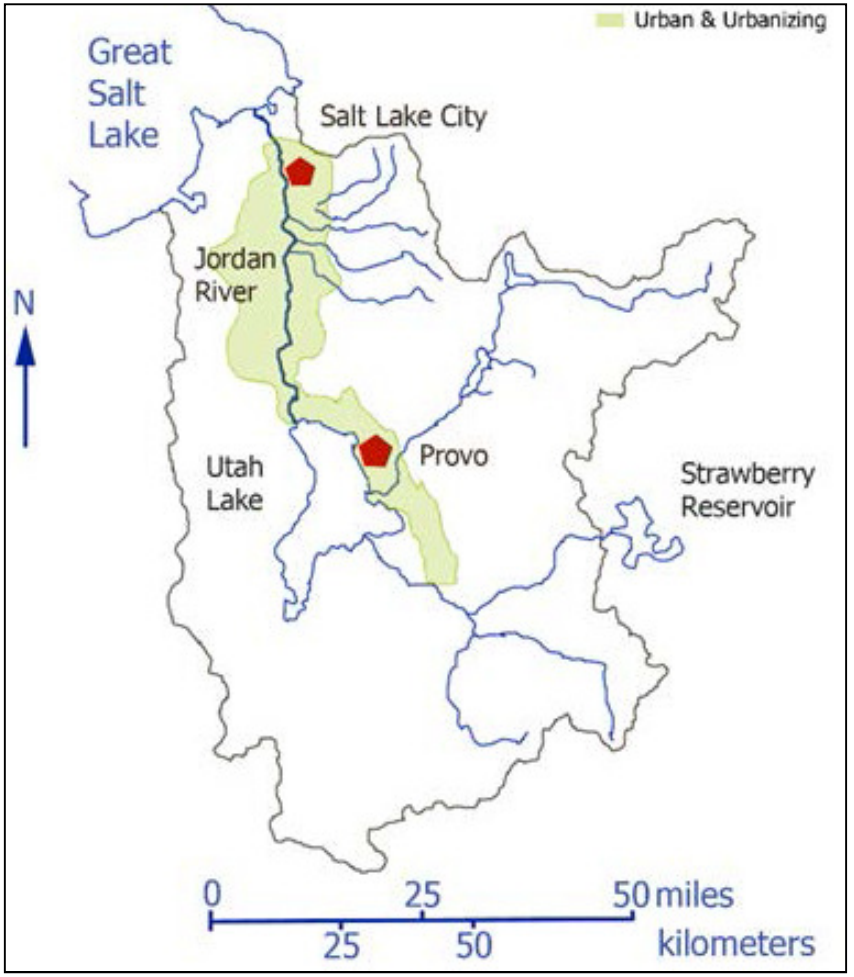
Model Selection and Development (Task 5)

Model build and calibration

- Completed by University of Utah
- EPA Office of Research and Development grant
- Coordination with EPA Region 8 and DWQ through MOU
- DWQ participation on modeling team

Model application to water quality criteria and TMDLs

- DWQ



Source: Michael Barber Ph.D. University of Utah

Phase 1 Report

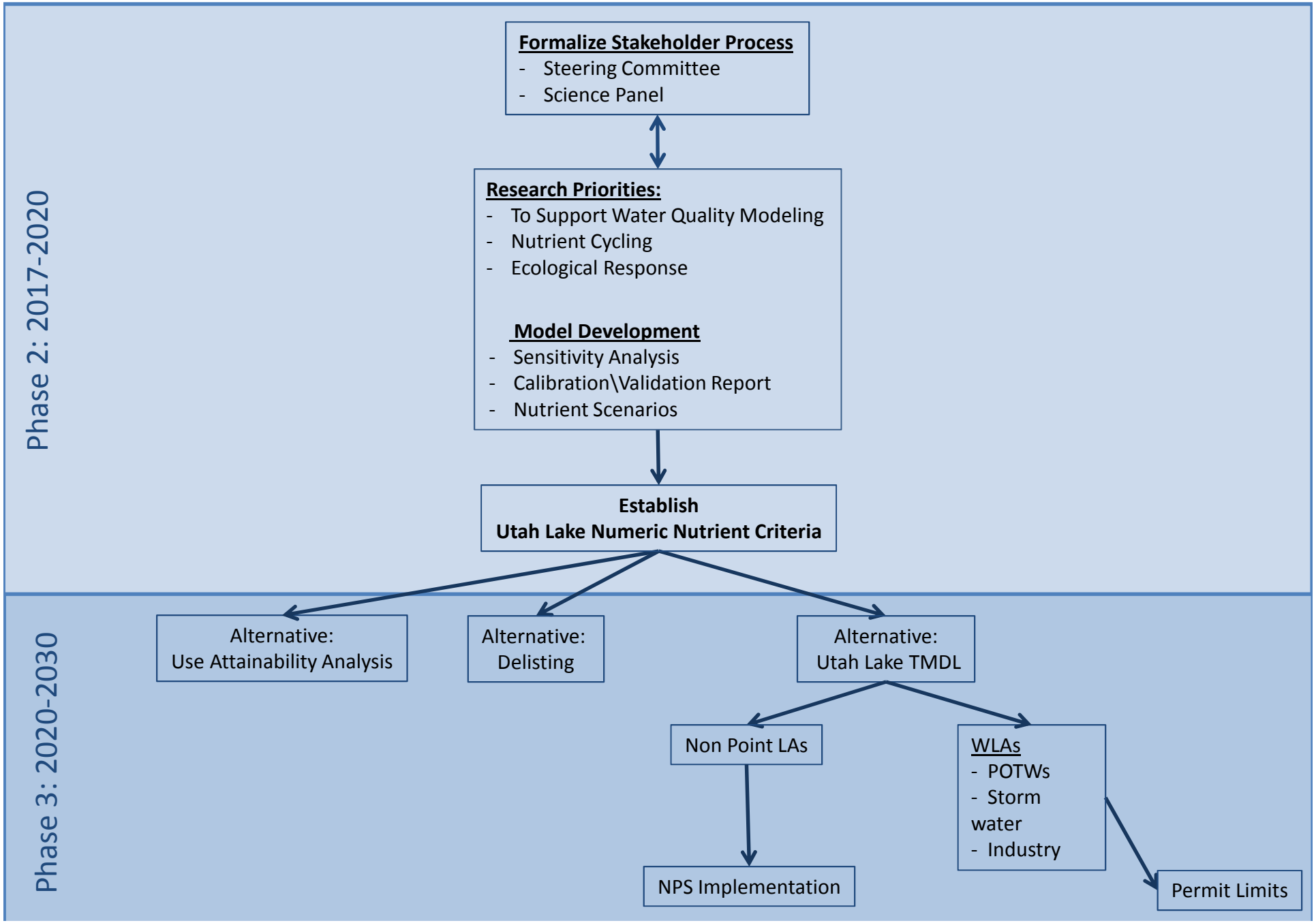
Work plan elements 1 through 5

- Stakeholder process summary
- Data management
- Shared stakeholder database
- Literature synthesis
- Baseline data characterization
- Data gaps identification
- Water quality model selection
- Model development update

Deliver Phase 1 Report to Science Panel

Moving Forward…

Site Specific Nutrient Criteria Development



Preliminary Study Questions

Nutrient Dynamics

- How are nutrients linked to algal blooms, dissolved oxygen, ammonia, and other water quality concerns in Utah Lake?
- What are the roles of internal lake processes, weather, and water management on nutrient cycling and algal blooms?

Loading Characteristics

- What is the origin, timing, and magnitude of nutrient loading to Utah Lake?
- How do nutrient loads to Utah Lake translate into downstream effects in the Jordan River and Great Salt Lake?

Recreation Use Survey

- What is the desired condition for recreational users?

Costs and Benefits

- How much will it cost for Utah County communities to reduce nutrients from wastewater, stormwater, and agricultural runoff?
- What are the economic and social costs of Harmful Algal Blooms?
- What are the benefits of improved water quality in Utah Lake to the fishery, recreational users, water users, and community development?

Rethinking Stakeholder Involvement

Stakeholder Process

Stakeholder Group

- Utah Lake Commission Technical Committee
- 100+ representatives:
  - Local municipalities, POTWs, universities, consultants, advocacy groups, water users, recreationists, government.
- Water quality subgroups for technical direction

Challenges

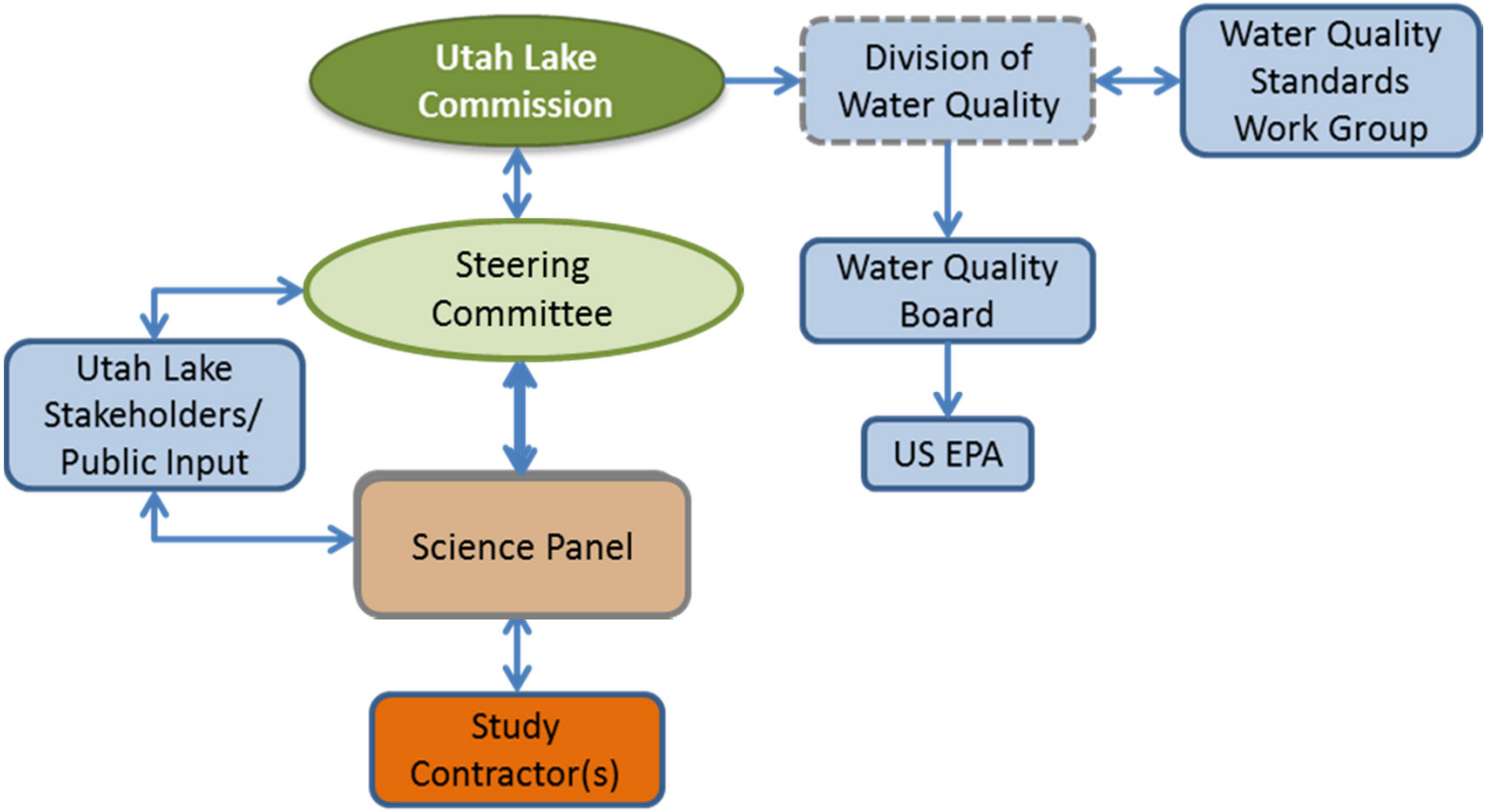
- Very large committee
- Stakeholders Under or unfairly represented
- Lack of common understanding of goals/endpoints
- Conflict resolution
- Limited/ineffective collaboration
- Consensus-based decision making

Process Goals

Revised Stakeholder Process

- Build partnerships among stakeholders
  - Consensus-based approach
  - Promote collaboration
  - Access to scientific and policy expertise
  - Coordinate funding sources
- Improved public process
  - Meeting facilitation
  - Refine stakeholder interests
  - Public input and comment
- Establish Science Panel
- Integrate science and policy making

Process Structure



Steering Committee Membership

Stakeholder Interest	Affiliation	Representative	Alternate
Utah Lake Commission (Co-chair)	Utah Lake Commission Executive Director	Eric Ellis	Sam Braegger
Water quality (Co-chair)	Utah Div. of Water Quality	Erica Gaddis	Scott Daly
Recreation, fishing, and sovereign lands	Utah Department of Natural Resources		Laura Ault
Agriculture/ water rights/ water users	Utah Lake Water Users Association	Jesse Stuart	Bill Marcovecchio
Fish and wildlife	U.S. Fish and Wildlife Service	George Weekley	Chris Cline
Agriculture	Utah Conservation Commission Zone,3, Utah Department of Agriculture and Food, or local agricultural interest	Jay Olsen (UDAF)	Daniel Gunnel (UDAF/Conservation Commission Zone 3)
Public health	Utah County Health Department	Jason Garrett	Craig Bostock
Recreation	Recreational club, anglers, hunters, or business	Garrett Smith (Utah Lake Water Ski Association)	Todd Fry (Bonneville Sailing Club)
Conservation and environment	Environment or conservation organization	Heidi Hoven (Audubon Society)	Ella Sorensen (Audubon Society)
Water management of Utah Lake	Central Utah Water Conservancy District or appropriate water manager	Gerard Yates (CUWCD)	Mike Rau (CUWCD)
Stormwater	Utah County	Jay Montgomery (Utah County Stormwater Association)	Richard Nielson (Utah County)
Publically Owned Treatment Works	Municipal or district	Jon Adams (Timp. SSD)	David Barlow (TSSD District Engineer)
Municipal	City Mayor or designee	Gary Calder (Water Resources Division Director, Provo City)	Cory Pierce (Wastewater Dvision Manager, Spanish Fork City)
Municipal	City Mayor or designee	Brad Stapley (Public Works Director, Springville)	Juan Garrido (Manager of Wastewater Treatment Plant, Springville City)
Municipal	City Mayor or designee	Neal Winterton (Water Resources Division Manager, Orem City)	Dave Norman (Water Systems Director, Lehi City)
Academia	University researcher	Dennis Shiozawa (BYU)	Nancy Mesner (USU)

Overview of Why We're Here Part II

Discussion